This listing of the claims replaces any and all prior versions and listings of claims in the application:

LISTING OF THE CLAIMS

1-16. (Canceled)

17. (Currently amended) A method of making a carbon-based hydrogen storage composition, comprising

providing a solvated alkali metal containing organic ligands having unsaturated groups;

combining a plurality of graphene sheets ~~carbon material~~ with the solvated alkali metal containing organic ligands to form a plurality of carbene sheets ~~a carbon material~~ co-intercalated with alkali metal cations containing organic ligands;

carrying out a Diels-Alder reaction between the unsaturated groups of the organic ligands and the graphene sheets ~~carbon material~~ to form ~~a pillared carbon material~~ graphene sheets covalently bonded to the organic ligands and having an interlayer distance of between 6Å and 12 Å; and

doping the ~~pillared carbon material~~ graphene sheets covalently bonded to the organic ligands with a metal.

18. (Original) The method of claim 17, wherein the alkali metal of the solvated alkali metal cation is selected from Li, Na, K, and combinations thereof.

19. (Original) The method of claim 17, wherein the doped metal is selected from alkali metals, alkaline-earth metals, and combinations thereof.

20. (Original) The method of claim 19, wherein the doped metal is selected from Li, Na, K, Be, Mg, Ca and combinations thereof.

21. (Canceled)

22. (Canceled)

23. (Currently amended) The method of claim 17, wherein said organic ligand solvated alkali metal ~~cation~~ comprises an organic solvent selected from heterocyclic solvents.

24. (Original) The method according to claim 23, wherein said organic solvent is a cyclic ether compound.

25. (Original) The method according to claim 24, wherein said organic solvent is 2,5-dihydrofuran.

26. (Currently amended) The method according to claim 17, wherein said doping includes intercalation of the metal and ball milling of the ~~pillared carbon material~~ graphene sheets covalently bonded to the organic ligands.

27. (Original) The method of claim 17, wherein the ~~carbon material~~ graphene sheets further comprises an impurity or an additive.

28. (Original) The method of claim 27, wherein the impurity or additive is selected from B, N and combinations thereof.

29. (Currently amended) The method of claim 17, wherein the atomic proportion of the metal to the carbon atoms in the ~~pillared carbon material~~ graphene sheets covalently bonded to the organic ligands is in the range of about 1:3 to about 1:24.

30. (Currently amended) The method of claim 29, wherein the atomic proportion of the metal to the carbon atoms in the ~~pillared carbon material~~ graphene sheets covalently bonded to the organic ligands is in the range of about 1:3 to about 1:8.

31. (Currently amended) The method of claim 30, wherein the atomic proportion of the metal to the carbon atoms in the ~~pillared carbon material~~ graphene sheets covalently bonded to the organic ligands is in the range of about 1:3 to about 1:6.

32. (Canceled)

33. (Canceled)

34. (Currently amended) The method of claim [[33]] 17, wherein the carbon-based composition has a molecular hydrogen storage capacity of at least about 3 wt.% at 25°C and a pressure of about 10 bar.

35. (Original) The method of claim 34, wherein the carbon-based composition has a molecular hydrogen storage capacity of at least about 6.5 wt.% at 25°C and a pressure of about 10 bar.

36. (Currently amended) In a method of making a hydrogen storage device, wherein a carbon material is used to store hydrogen, the improvement which comprises employing a carbon-based composition comprising a ~~pillared~~ carbon material doped with a metal, wherein the ~~pillared~~ carbon material comprises a plurality of graphene sheets ~~carbon material parts~~ separated from each other by metal cations, and wherein the metal cations are solvated by organic ligands covalently attached to the graphene sheets ~~a pillar material~~.

37-43. (Canceled)